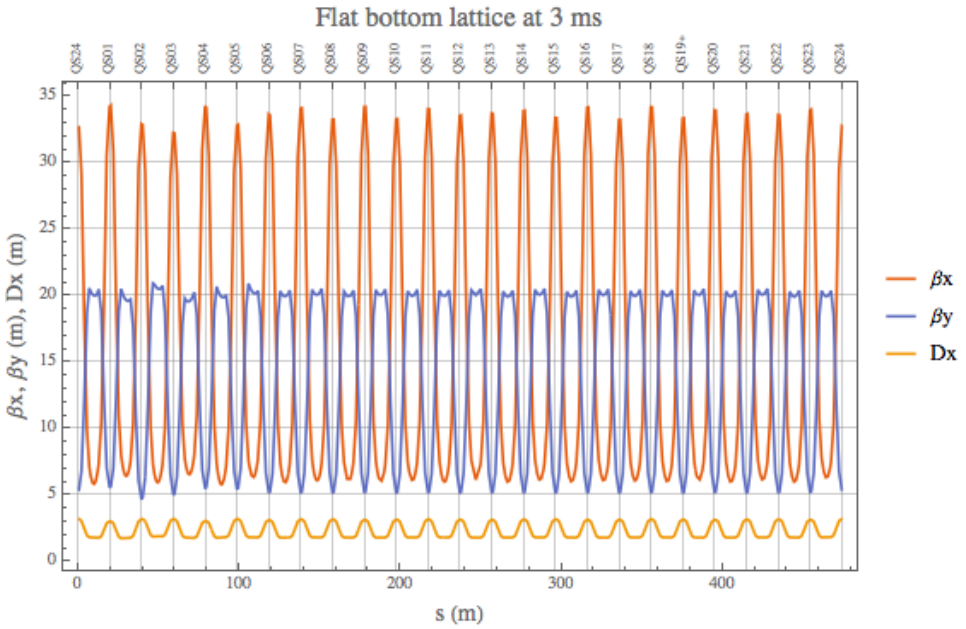
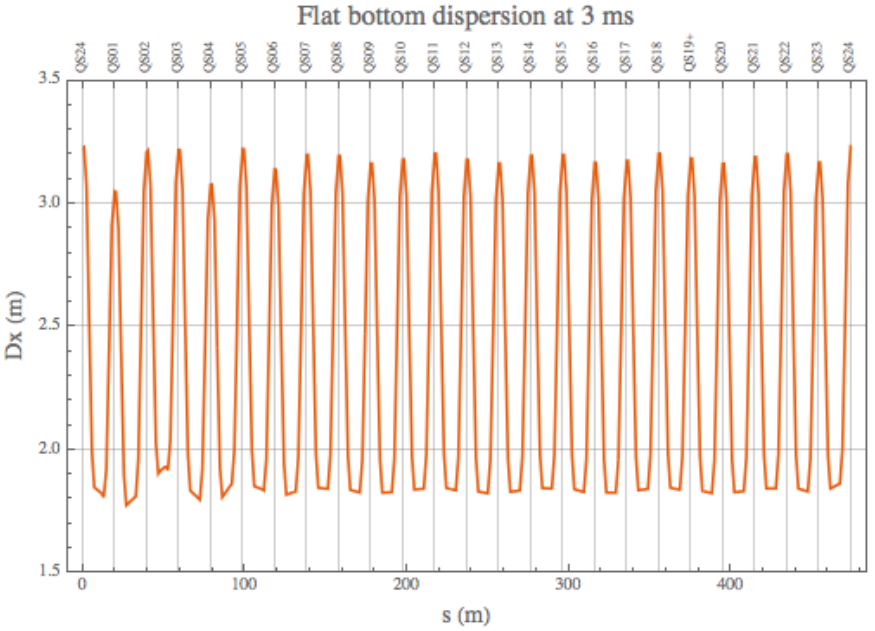
Booster lattice measurements

C.Y. Tan & K. Seiya
03 May 2017

Pseudo-flat2





βy is better that the pseudo-flat1, βx is worse than pseudo-flat1.

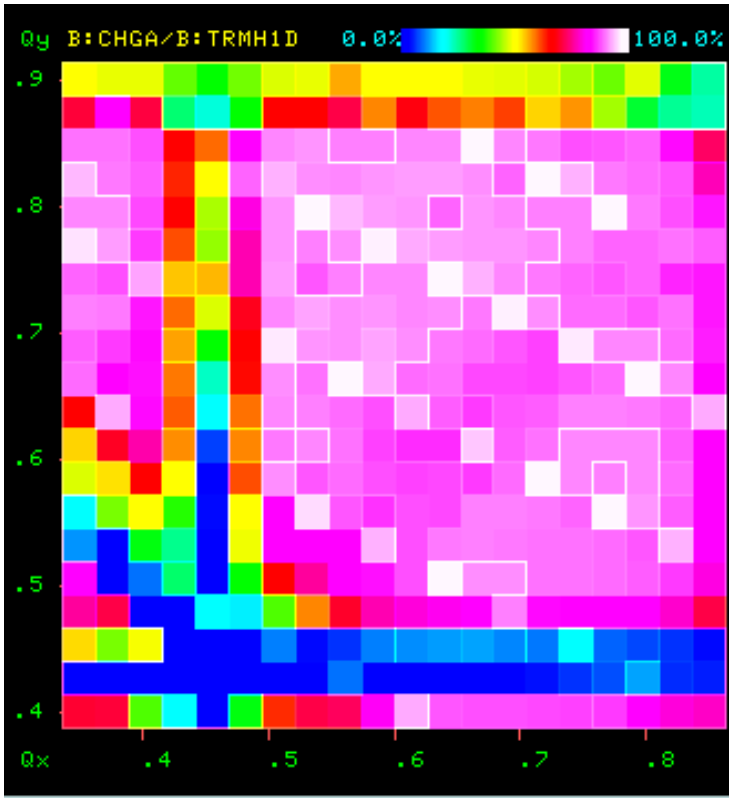
Improved εx and εy

Pseudo-flat 1 →

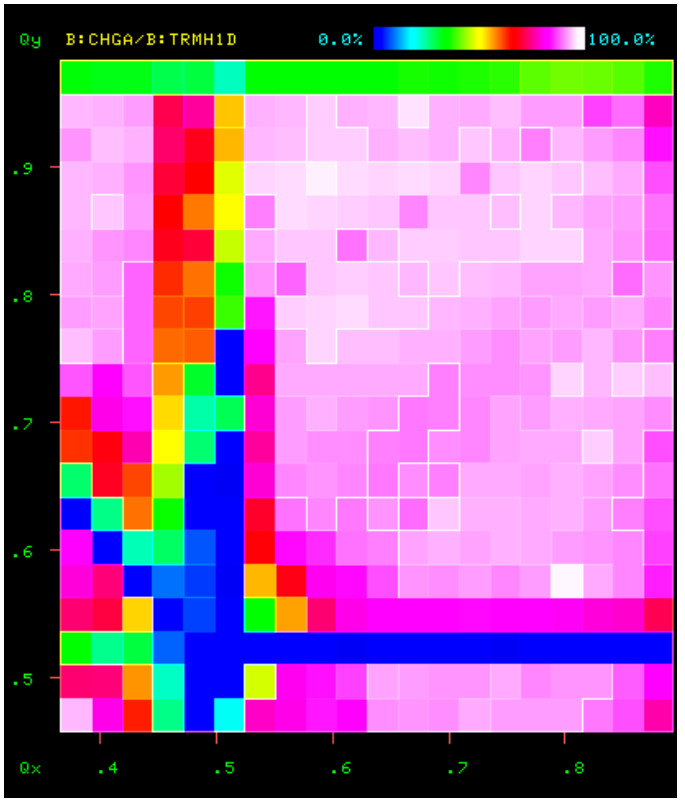
Pseudo-flat 2 →

Lattice	turn	N_surv	$\varepsilon_x^{(r.m.s.)}$	$\varepsilon_y^{(r.m.s.)}$	σ_{pt}	$\sigma_t \times c$
all	1	5000	2.462e-06	2.440e-06	0.00136	0.962
HEP	2000	2689	1.252e-5	6.367e-6	0.00113	0.982
Flat-top	2000	4985	3.639e-06	3.795e-06	0.00126	1.091
Flat-bottom	2000	4996	3.083e-06	2.991e-06	0.00127	1.071
Dogless	2000	5000	2.535e-06	2.534e-06	0.00127	1.065
Flat-disp	2000	4982	3.045e-6	2.894e-6	0.00126	1.085
Flat-disp*	2000	4976	3.219e-6	2.915e-6	0.00126	1.083

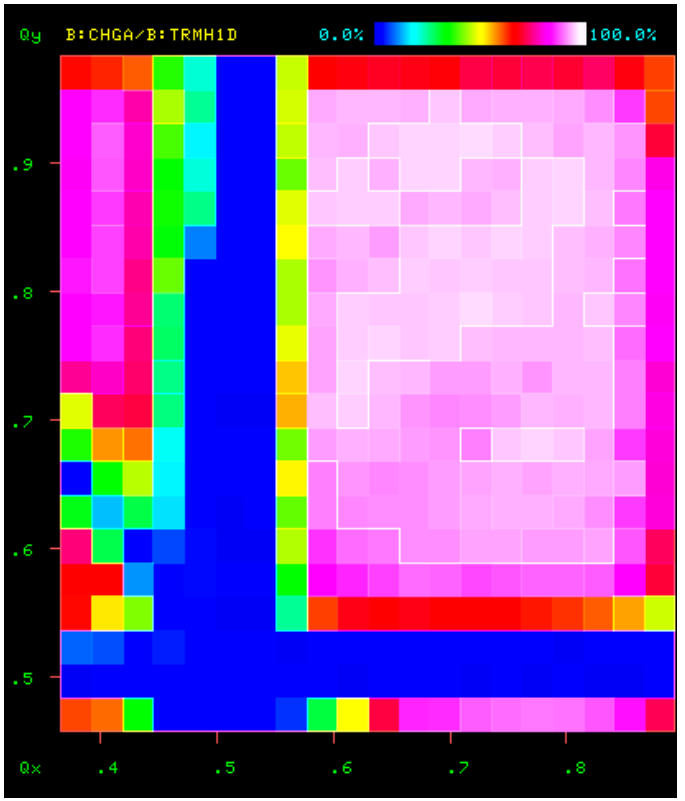
Tune scan



Pseudo-flat lattice 1



Pseudo-flat lattice 2



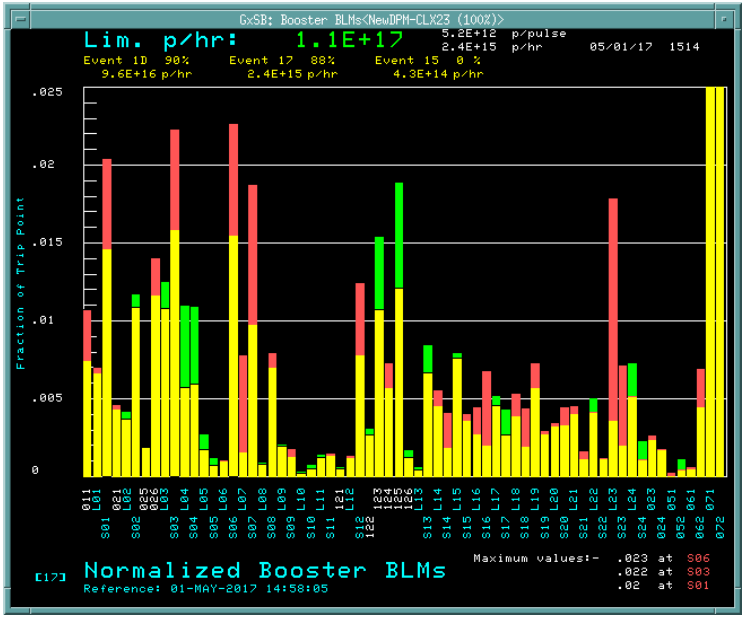
HEP

Pseudo-flat lattice 2 has smaller vertical 1/2 integer resonance and slightly larger horizontal 1/2 integer resonance.
Both pseudo-flat lattices are much improved over HEP lattice.

Efficiency not improved with Pseudo-flat lattice 2

- Efficiency is always ~1% lower than HEP
  - Tuned 400 MeV injection line quads. No improvement.
  - Smoothed 3 ms orbit to HEP orbit. No improvement.
  - Individual 3 bumps are aperture restrictions. No improvement.

If the emittances are improved by > 2 from simulations, then we shouldn't be scraping!



To Do

- Smoothing earlier and later slots.
  - Only 3 ms slot smoothed at this time.
- Open up collimators.
- Tune with quad modulation.
- Start thinking about spoiling flatness.